

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (*Currently Amended*): A solenoid for providing linear actuation, comprising:
- a) first and second polepieces having axial bores coaxially disposed along a common axis;
 - b) an electrical conductor wound about said polepieces in a plurality of turns;
 - c) an armature slidably disposed in said axial bores;
 - d) a bearing axially disposed retained in one of said first and second polepieces; and
 - e) a shaft attached coaxially to said armature and extending through a supportive bore in said bearing wherein said bearing radially supports said shaft, said shaft being axially displaceable by electromagnetic displacement of said armature to provide said actuation.

2. (*Original*): A solenoid in accordance with Claim 1 wherein said armature is separated from said polepieces by a generally cylindrical air gap.

3. (*Original*): A solenoid in accordance with Claim 1 wherein said armature is frusto-conical.

4. (*Original*): A solenoid in accordance with Claim 1 wherein said solenoid is included in an actuator attachable to a device for providing linear actuation to said device.

5. (*Original*): A solenoid in accordance with Claim 1 wherein the respective diameters of said bearing bore and said shaft are as nearly identical as is possible without engendering drag on said shaft.


6. (*Currently Amended*): A valve assembly for exhaust gas recirculation between the exhaust manifold and the intake manifold of an internal combustion engine, said assembly including an exhaust gas recirculation valve and further including a solenoid actuator attached to said valve, said solenoid actuator having first and second polepieces having axial bores coaxially disposed along a common axis, an electrical conductor wound about said polepieces in a plurality of turns, an armature slidably disposed in said axial bores, a bearing axially disposed retained in one of said first and second polepieces, and a shaft attached coaxially to said armature and extending through a supportive bore in said bearing wherein said

bearing radially supports said shaft, said shaft being axially displaceable by
electromagnetic displacement of said armature to provide actuation of said valve.

7. (*Currently Amended*): An internal combustion engine, comprising:


a) an intake manifold;

b) an exhaust manifold; and



c) a valve assembly for exhaust gas recirculation between said
exhaust manifold and said intake manifold, said assembly including an
exhaust gas recirculation valve and further including a solenoid actuator
attached to said valve and having first and second polepieces having axial
bores coaxially disposed along a common axis, an electrical conductor wound
about said polepieces in a plurality of turns, an armature slidably disposed in
said axial bores, a bearing axially disposed retained in one of said first and
second polepieces, and a shaft attached coaxially to said armature and
extending through a supportive bore in said bearing wherein said bearing
radially supports said shaft, said shaft being axially displaceable by
electromagnetic displacement of said armature to provide actuation of said
valve to admit exhaust gas from said exhaust manifold into said intake
manifold.

8. (*Currently Amended*): A solenoid for providing linear actuation,
comprising:

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- a) a housing;
 - b) first and second polepieces, within said housing, having axial bores coaxially disposed along a common axis;
 - c) an electrical conductor wound about said polepieces in a plurality of turns;
 - d) an armature slidably disposed in said axial bores;
 - e) a bearing axially ~~disposed~~ retained in one of said first and second polepieces; and
 - f) a shaft attached coaxially to said armature and extending through a supportive bore in said bearing wherein said bearing radially supports said shaft, said shaft being axially displaceable by electromagnetic displacement of said armature to provide said actuation.

9. (*Previously presented*): A solenoid in accordance with Claim 8 wherein said armature is separated from said polepieces by a generally cylindrical air gap.

10. (*Previously presented*): A solenoid in accordance with Claim 8 wherein said armature is frusto-conical.

11. (*Previously presented*): A solenoid in accordance with Claim 8 wherein said solenoid is included in an actuator attachable to a device for providing linear actuation to said device.

12. (*Previously presented*): A solenoid in accordance with Claim 8 wherein the respective diameters of said bearing bore and said shaft are as nearly identical as is possible without engendering drag on said shaft.

13. (New) A solenoid in accordance with Claim 1 wherein said bearing has an axial length that is at least 1.5 times larger than the diameter of said shaft.

14. (New) A solenoid in accordance with Claim 6 wherein said bearing has an axial length that is at least 1.5 times larger than the diameter of said shaft.

15. (New) A solenoid in accordance with Claim 7 wherein said bearing has an axial length that is at least 1.5 times larger than the diameter of said shaft.

16. (New) A solenoid in accordance with Claim 8 wherein said bearing has an axial length that is at least 1.5 times larger than the diameter of said shaft.
